CLAIMS

What is claimed is:

1. A system for communicating information from a downhole location in a hydrocarbon borehole to the surface comprising:

a plurality of releasable vessels positioned at the downhole location, the vessels containing signal information affixed to the vessels prior to placement of the vessels downhole, and said signal information indicating the presence of at least one of three or more predetermined downhole conditions;

a detecting system on the surface positioned and adapted to detect the signal information on one or more of the vessels; and

a processing system on the surface programmed to establish the presence of the predetermined downhole condition based on the signal information.

2. A system according to claim 1 further comprising a releasing system adapted to release the vessels at the occurrence of a predetermined event.

3. A system according to claim 2 further comprising a sensor in communication with the releasing system adapted to sense downhole conditions and wherein the releasing system releases the vessels when the predetermined event is indicated by the sensor.

4. A system according to claim 3 wherein the predetermined event is met when a value sensed by the

sensor reaches a predetermined threshold value, and the predetermined downhole condition is the sensing of the predetermined threshold value at the location of the sensor.

5. A system according to claim 1 wherein a plurality of vessels are placed at a plurality of predetermined positions in the borehole.

6. A system according to claim 1 wherein the signal information is sufficient to determine at the surface (1) a value sensed by a sensor and (2) a location where the value was sensed.

7. A system according to claim 1 wherein the vessels are adapted to be convected to the surface by the flow of fluids in the borehole.

8. A system according to claim 1 wherein each of the vessels are sealed in a non conductive medium.

9. A system according to claim 1 wherein the vessels each comprise one or more radio frequency devices that acquire substantially all energy needed for operation by exposure to externally created electromagnetic field.

10. A system according to claim 9 wherein the radio frequency devices are RF tags.

11. A system according to claim 10 wherein the RF tags are read-only.

12. A system according to claim 9 wherein the radio frequency devices are simple dipole antennae.

13. A system according to claim 12 wherein each of the vessels comprises a plurality of dipole antennae each tuned to resonate at a different frequency, and the signal information being contained in the combination of frequencies.

14. A system according to claim 1 wherein the vessels are spherical in shape.

15. A system according to claim 14 wherein the vessels are at most 2 centimeters in diameter

16. A system according to claim 10 wherein the vessels are hollow and an RF tag is positioned inside each vessel.

17. A system according to claim 16 wherein the vessels are filled with a fluid.

18. A system according to claim 10 wherein each vessel is primarily solid epoxy surrounding the RF tag.

19. A system according to claim 1 wherein the vessels is cone shaped.

20. A system according to claim 1 wherein the vessels are kite shaped.

21. A system according to claim 1 wherein the detection system is adapted to detect the presence of the vessels as the vessel fly by through a tube containing fluid produced form the borehole.

22. A system according to claim 21 wherein the detection system is adapted to detect the signal information as the vessel fly by through a tube containing fluid produced from the borehole.

23. A system according to claim 1 wherein the detection system comprises a sieve or filter.

24. A system according to claim 1 wherein the detection system is adapted to retrieve the vessels from a surface separations system for separating oil and water.

25. A system according to claim 1 wherein each vessel comprises at least one microdot.

26. A system according to claim 25 wherein each vessel further comprises at least one radio frequency device that acquire substantially all energy needed for operation by exposure to externally created electromagnetic field.

27. A system according to claim 26 wherein the radio frequency device indicates to the presence of the vessel to the detecting system and the microdot indicates the signal information to the detecting system.

28. A system according to claim 1 wherein the at least one predetermined downhole condition is a characteristic of fluid being produced from the borehole.

29. A system according to claim 1 wherein the at least one predetermined condition is predetermined fraction of water sensed at a particular location.

30. A system according to claim 1 wherein the at least one predetermined condition is a predetermined level of mechanical wear or damage to equipment located downhole.

31. A system according to claim 30 wherein the at least one predetermined condition is a predetermined level of mechanical wear or damage to a drill bit.

32. A system according to claim 30 wherein the at least one predetermined condition is a predetermined level of erosion of a slotted and/or expandable wellbore liner.

33. A system according to claim 1 wherein the releasable vessels are positioned on a wireline tool.

34. A system according to claim 1 wherein the releasable vessels are positioned on a perforation tool and the at least one predetermined downhole condition is the firing of at least one charge on the perforation tool.

35. A method for communicating information to the surface from a downhole location in a hydrocarbon borehole comprising the steps of:

positioning a plurality of releasable vessels at the location downhole, the releasable vessels including signal information affixed to the vessels prior to placement of the vessels downhole, and said signal information indicating the presence of a predetermined downhole condition;

detecting on the surface the signal information on one or more of the vessels;

establishing the presence of the predetermined downhole condition based on the detected signal information.

36. A method according to claim 35 further comprising the step of releasing the vessels at the occurrence of a predetermined event.

37. A method according to claim 36 further comprising the step of sensing the predetermined downhole condition and wherein the vessels are released when the predetermined event is sensed.

38. A method according to claim 37 wherein predetermined event is met when a value sensed reaches a predetermined threshold value, and the predetermined downhole condition is the sensing of the predetermined threshold value at the location where the sensing takes place.

39. A method according to claim 35 wherein the vessels each comprise one or more radio frequency devices that acquire substantially all energy needed for operation by exposure to externally created electromagnetic field.

40. A method according to claim 39 wherein the radio frequency devices are simple dipole antennae.

41. A method according to claim 35 wherein the vessels are at most 2 centimeters in diameter.

42. A method according to claim 35 the step of detecting comprises detecting the signal information as the vessel flows through a tube containing fluid produced form the borehole.

43. A method according to claim 35 wherein each vessel comprises at least one microdot.

44. A method according to claim 35 wherein the predetermined downhole condition is a characteristic of fluid being produced from the borehole.

45. A method according to claim 35 wherein the predetermined condition is a predetermined level of mechanical wear or damage to equipment located downhole.

46. A method according to claim 35 wherein vessels are positioned on a perforation tool and the predetermined downhole condition is the firing of one or more charges on the perforation tool.